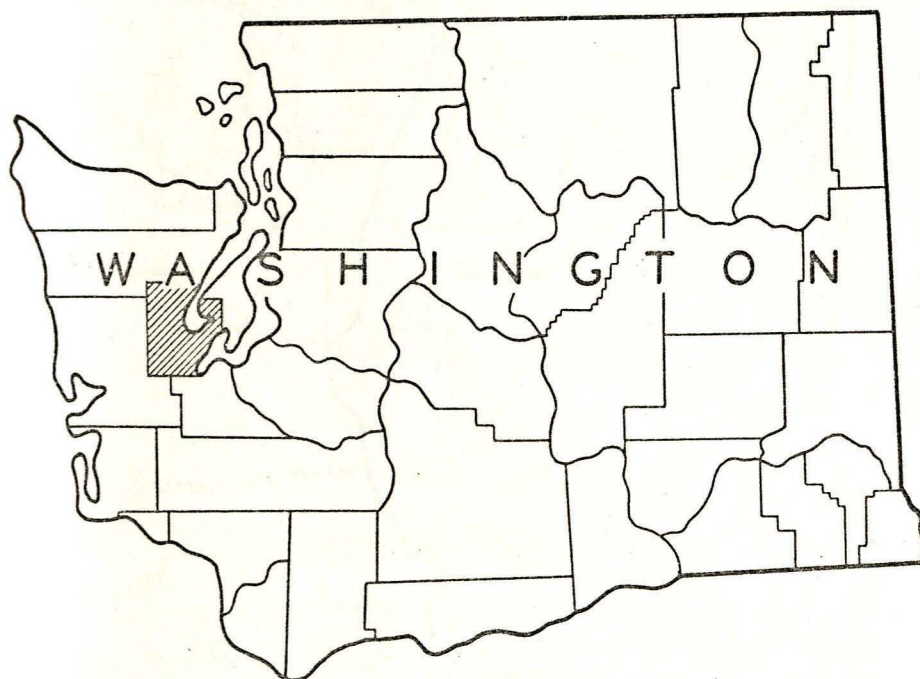


FOREST STATISTICS FOR MASON COUNTY, WASHINGTON

FROM THE FOREST SURVEY INVENTORY REVISED IN 1940
FOREST SURVEY REPORT NO. 86



U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
STEPHEN N. WYCKOFF, DIRECTOR

R.W.COWLIN, IN CHARGE OF FOREST SURVEY F.L.MORAVETS, ASSISTANT.

PORTLAND, OREGON

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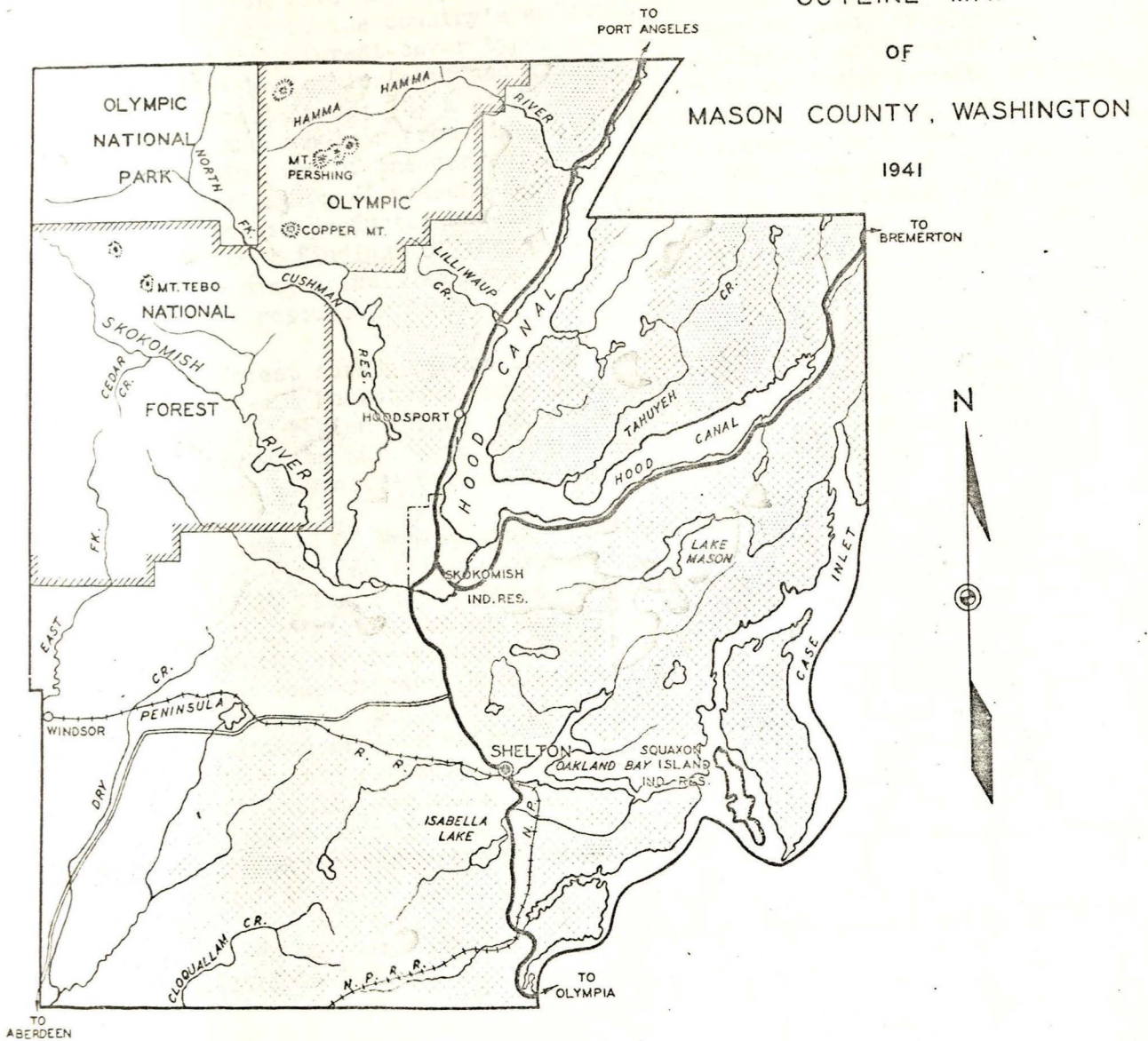
FIGURE 1.

OUTLINE MAP

OF

MASON COUNTY, WASHINGTON

1941



SCALE

0 5 10 15 MILES

LEGEND

	SAW TIMBER		DEFORESTED CUTOVERS AND BURNS
	SECOND GROWTH		NONCOMMERCIAL FORESTS AND NONFOREST LAND

FOREWORD

The forest survey, a Nation-wide project, consists of a detailed investigation in five major parts of present and future forest resources: (1) An inventory of the country's existing forest resources in terms of areas occupied by forest-cover types and of timber volumes, by species, in board feet and cubic feet, and a study of conditions on cut-over and on burned forest lands; (2) a study of the depletion of the forests through cutting and through loss from fire, insects, disease, and other causes; (3) a determination of the current and potential growth on forest areas; (4) an investigation of present and prospective requirements of the United States for forest products; and (5) an analysis and correlation with other economic data of findings of these studies in order to make available basic facts and guiding principles necessary to plan for sound management and use of forest resources.

The forest survey of Oregon and Washington, an activity of the Pacific Northwest Forest and Range Experiment Station, was conducted in the Douglas-fir region during the period 1930-33, inclusive.* In 1937 work of keeping the survey up to date was commenced in counties in which there had been extensive depletion since the original survey.

The forests of Mason County, Washington, were first inventoried in the spring of 1932 and a report summarizing results of the inventory was issued in 1934. The report, Forest Statistics for Mason County, Washington, gave preliminary statistics on timber volume, forest type area, and productive capacity of the county's forest land. In the summer of 1940 the inventory was made current through field examination covering the entire county and recompilation of the statistical data. In the field the reinventory consisted of examination of all cut-over areas logged prior to 1930 and all burned areas to determine the condition of regeneration, checking of location and extent of lands logged since January 1, 1930, as shown by cut-over reports, and mapping of lands cleared for agricultural use. The ownership status of all lands in the county was also brought up to date.

Results of this reinventory are given in this report which follows the one issued in 1934.

* Oregon and Washington were divided for survey purposes into two regions, (1) Douglas-fir region, consisting of that part of both States west of the Cascade Range summit, and (2) ponderosa pine region, that part of both States east of the Cascade Range summit. A regional report which includes an interpretation of the forest-survey data and analysis of the forest situation in the Douglas-fir region has been published and a similar report for the ponderosa pine region is now in the process of being published. Each region was divided into units--11 in the Douglas-fir region and 7 in the ponderosa pine region--for the purpose of more intensive analysis of data. It is planned to issue reports presenting findings for each unit.

FOREST STATISTICS FOR MASON COUNTY, WASHINGTON

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FOREST STATISTICS FOR MASON COUNTY, WASHINGTON^{1/}

By F. L. Moravets^{2/}

The forests of Mason County, Washington, have constituted one of the most accessible sources of raw material for the huge lumbering industry of the Puget Sound district. Located near the southern portion of the Sound, all parts of the county are within 22 miles of tidewater. Continuous saw-timber stands of Douglas-fir, easy accessibility, and favorable topography resulted in logging on a large scale, particularly in the last two decades. Early statistics on sawlog production are not available, but those compiled by the Forest Service in cooperation with the Bureau of the Census since 1924 show a total cut of 3.5 billion board feet in the county during the 16-year period ending in 1940.

What has been the effect of harvesting operations of these proportions on the extent and character of the forest resource of the county? The answer is to be found in an analysis of the statistical data obtained in the original inventory of the county's forests in 1932 and the reinventory in 1940.

The Original Forest

Although the extent and character of the original forest that clothed the county is somewhat a matter of conjecture, the present forest type pattern indicates that prior to white settlement and logging, conifer timber of saw-timber size (about 20 inches and more d.b.h.) undoubtedly reached from the tideflats on Puget Sound to the barrens on the higher peaks and ridges of the Olympic Mountains in the northwestern portion of the county. Only a few immature stands of any extent broke up this continuity. Other breaks in the conifer cover occurred along stream courses where the alluvial bottomlands were occupied by pure hardwood stands, on swampy areas too poorly drained to permit tree growth, and on dry gravelly flats.

Physical factors which influence the occurrence of the tree species indigenous to the region are fairly uniform over a large part of the county. The topography of most of the county's surface is gentle. Bordering Puget Sound it is rolling; farther inland it becomes more level and a large part of the west-central portion is a slightly rolling upland.

^{1/} Assistance in the compilation of the data contained in this report was furnished by the personnel of Work Projects Administration official project 65-2-94-144.

^{2/} Field work of the revised inventory of the county's forest resources was done by D. L. Lynch; compilation of data was done by Edna L. Hunt, T. J. Rowe, and W. E. Zeuthen.

plateau. Much of this gentle topography is mantled with deposits of glacial drift composed principally of sand and gravel of varying textures and depths. Large areas of this coarse-textured soil are underlaid with hardpan. Lying in the lee of the Olympic Mountains and influenced by the waters of the Sound, the climate of this portion of the county is temperate and oceanic in character. Annual precipitation averages about 50 inches. However, the rainfall is seasonal with the bulk of it occurring from November to May and very little during the summer months. This particular combination of physical factors produces a site that favors the growth of Douglas-fir and this species originally comprised from 75 to 100 percent of the stands stocking this portion of the county. In the southern portion a relatively low but rough range of hills, known as the Black Hills, trends east and west. Here, too, the predominant forest cover was Douglas-fir. In the rugged mountainous northwestern portion of the county, which rises from low foothills to high peaks of the Olympic Mountains, Douglas-fir extended up to an elevation of from 2,500 to 3,000 feet, depending on exposure. Above this elevation and in a zone in which the climate is less temperate and characterized by heavy precipitation, averaging well over 100 inches annually, there was a belt of mixed stands; first, those in which western hemlock was the key tree, and higher up the slopes and extending to the subalpine timber zone the upper-slope type comprised of varying mixtures of such species as Pacific silver fir, mountain hemlock, western hemlock, western white pine, and Alaska yellow-cedar.

The character of the soil over the vast bulk of the lower-lying portion of the county is such that the timber-producing capacity of the site averages relatively low. As a result the Douglas-fir produced here was a slow-growth type of timber considerably smaller in diameter than the average fir timber grown in the Douglas-fir region of western Washington and western Oregon. Although of average quality, it was inferior to the large old-growth fir of the region.

The Present Forest

After nearly a century of settlement and logging more than 95 percent of the county's land area of 612,270 acres is still forest land. Only about 3 percent is in agricultural use, either cultivated or stump pasture, and less than 2 percent is nonforest other than agricultural, a classification that includes mountain barrens, tidelands, town sites, swamps, and unmeandered water. However, in figure 1, which shows in a generalized way the present cover pattern, it is seen that the once almost continuous timber stand now occupies roughly about a fourth of the county's area. A detailed forest type map,^{3/} one of the results of the

^{3/} One-inch-to-the-mile county type maps and $\frac{1}{4}$ -inch-to-the-mile lithographed State type maps have been prepared to show the location and extent of the forest cover types. For information on them, address Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland, Oreg.

forest survey, pictures much more clearly the extent and progress of logging operations across the county and the resultant creation of a variety of conditions ranging from recent cut-over land, nonrestocked older cut-over areas, areas restocked with second growth of varying age and density, to the remaining uncut stands. Table 1 shows statistically the distribution of the individual forest types by ownership class.

Conifer Saw Timber

The bulk of the remaining conifer timber of saw-timber size is concentrated in the northwest quarter of the county. Of the total of 149 thousand acres of this class of timber, occupying less than 26 percent of the county's forest land, 109 thousand acres is within the exterior boundaries of the Olympic National Forest and the Olympic National Park and most of the remainder lies just outside the national forest boundaries. In the progress of logging across the county occasional tracts of saw timber were left, but subsequent operations have reduced these to scattered stands of from 40 to 2,000 acres in extent. The greatest concentration of these small tracts is in the east-central part of the county south of Hood Canal.

On approximately 109.5 thousand acres, or 74 percent of the total saw-timber acreage in the county, the stands are composed principally of Douglas-fir, this species comprising from 60 to 100 percent of the merchantable volume in the stand.

On 34.4 thousand acres the majority of the volume is in large old-growth Douglas-fir more than 40 inches d.b.h. (type 6). As a rule, stands of this class of timber in the county are of fairly heavy stocking with an average volume per acre of about 50 thousand board feet. Most of the stands are from 400 to 600 years in age and the timber has considerable surface clear length. Defect is fairly low but, due to rough ground where the remaining stands are located, the breakage in falling will be high. This timber should cut a fairly high percentage of No. 1 logs. The larger bodies of this large old-growth Douglas-fir lie in the drainages of the Middle Fork Satsop River, the South Fork Skokomish River, and the North Fork Skokomish River above Cushman Reservoir. Most of the remaining acreage of this class of timber is in Federal ownership, table 1. Approximately 23.7 thousand acres is on national forest land available for cutting; an additional 1.1 thousand acres is in the national forest primitive area and reserved from cutting, and 3.7 thousand acres is in the Olympic National Park and reserved from cutting. Approximately 4.9 thousand acres is in private ownership.

Small old-growth Douglas-fir from 20 to 40 inches d.b.h. (type 7) stocks a total of 66.3 thousand acres. This class of timber was the predominant type over most of the county, the product of a site relatively low in productivity. Samples taken in this type during the survey show the trees to average about 34 inches d.b.h. and the stands to vary from 20 to 50 thousand board feet per acre. On a whole the timber is sound

Table 1.-Area, in acres, of all forest cover types, by ownership class
Data corrected to August 15, 1940

Type no.	Type	Private	State ^{1/}	County	Municipal ^{2/}	Indian	Federal				Total
							National forest		National park ^{2/}	Other ^{3/}	
							Available	Reserved			
6	Douglas-fir										
	Large old growth	4,905	890	5	45		23,675	1,080	3,720	40	34,360
7	Small old growth	24,640	4,660	675	660		31,630	285	3,740	25	66,315
8	Large second growth	4,210	930	285			3,390	45			8,860
9	Small second growth	84,040	5,810	11,470	220	1,655	840			215	104,250
10	Seedlings and saplings	102,080	13,060	30,445	1,900	1,870	3,450	120	735	350	154,010
	Western hemlock										
14	Large	155	125				18,725	2,475	4,245		25,725
15	Small	545	45	20			880	75	5		1,570
16	Seedlings and saplings		75								75
	Western redcedar										
17	Large	255			30		400		40		725
19	Small	120									120
23	Fir-mountain hemlock, large						3,130	1,050	8,420		12,600
26	Lodgepole pine, small	2,105	550	240						25	2,920
	Hardwood										
31.5	Large	6,260	345	540		485					7,630
31	Small	4,985	20	135		465			40		5,645
33	Subalpine						4,280	9,325	10,970		24,575
	Nonrestocked cutover										
35	Cut prior to 1920	8,620	390	2,525		60				60	11,655
35A	Cut from 1920-29, incl.	25,315	7,335	7,175			425				40,250
36	Recent cutover, since 1930	49,425	6,355	2,875	325	40	4,600			70	63,690
37	Deforested burn	390	65	105	45		4,295	4,005	1,640		10,545
38	Noncommercial rocky area						4,480	1,045	985		6,510
	Total forest types	318,050	40,655	56,495	3,225	4,575	104,200	19,505	34,540	785	582,030
	Nonforest land										
3	In agricultural use	17,715	75	20	95	540					18,445
2	Other	4,385	320	370		175	370	4,885	1,290		11,795
	Total	340,150	41,050	56,885	3,320	5,290	104,570	24,390	35,830	785	612,270

1/ Available for cutting. 2/ Reserved from cutting. 3/ Includes 665 acres available for cutting and 120 acres reserved from cutting.

and has considerable surface clear but will cut few No. 1 logs. Nearly all of the scattered tracts of saw timber in the lower-lying portion of the county are stocked with this type. Two large continuous bodies of this class of timber remain--one of about 16 thousand acres lies between the South Fork Skokomish River and Cushman Reservoir, and the other of slightly less acreage is south of the South Fork Skokomish River and east of the Satsop River drainage. Approximately 24.6 thousand acres of the type is in private ownership; 4.7 thousand acres is owned by the State; 31.9 thousand acres is national forest land, nearly all available for cutting; and about 3.7 thousand acres is in the national park.

Slightly less than 8.9 thousand acres is stocked with second-growth Douglas-fir saw timber from 20 to 40 inches d.b.h. (type 8). The timber in this type is less than 200 years of age, sound in quality, but usually coarse-grained. About three-fifths of the acreage of the type is in small scattered tracts in the eastern half of the county, principally in private ownership. The remainder is on national forest land chiefly in the Middle Fork Satsop River drainage.

The acreage of saw-timber stands in which western hemlock is the key tree (type 14) have been reduced very little by logging operations. All of the stands are located in the more inaccessible northwestern portion of the county. Practically all of the 25.7 thousand acres in this type is national forest and national park land. Stands of this type usually contain a mixture of western hemlock, Pacific silver fir, western redcedar, western white pine, and Alaska yellow-cedar. Timber of all of these species in the county is of average quality.

Higher up the slopes and even more inaccessible than the hemlock type occur the fir-mountain hemlock saw-timber stands (type 23) composed of varying mixtures of Pacific silver fir, mountain hemlock, western hemlock, Alaska yellow-cedar, and western white pine. All of the 12.6 thousand acres is in Federal ownership in the national forest and national park.

Western redcedar (type 17), the only other conifer saw-timber type in the county, has a total area of only 725 acres.

In table 2, which shows the area, in acres, of generalized forest types, by ownership class, summarized statistics on conifer saw timber in the county are given. A total of 34.2 thousand acres, or 23 percent of the total area, is in private ownership; 6.6 thousand acres, or about 5 percent, is owned by the State; and 106.1 thousand acres, or about 71 percent, is Federally owned. Saw timber on 81.0 thousand acres in Federal ownership is available for cutting.

Figure 2 graphically shows the extent of the saw-timber stands in relation to the other generalized forest types in the county and also the ratio of private to public ownership.

Table 2.-Area, in acres, of generalized forest types, by ownership class
Data corrected to August 15, 1940

Type definition	Private	State ^{1/}	County	Municipal ^{2/}	Indian	Federal				Total
						National forest Available	National forest Reserved	National park ^{2/}	Other ^{3/}	
Conifer saw timber Types 6, 7, 8, 14, 17, & 23	34,165	6,605	965	735		80,950	4,935	20,165	65	148,585
Conifer second growth Types 9, 15, and 19										
On cut-over areas	75,870	4,530	8,915	220	1,655				115	91,305
On old burns	8,835	1,325	2,575			1,720	75	5	100	14,635
Total	84,705	5,855	11,490	220	1,655	1,720	75	5	215	105,940
Conifer seedlings and saplings Types 10 and 16										
On cut-over areas	101,165	13,115	30,430	1,890	1,870	3,185	60		350	152,065
On old burns	915	20	15	10		265	60	735		2,020
Total	102,080	13,135	30,445	1,900	1,870	3,450	120	735	350	154,085
Recent cut-over areas Type 36	49,425	6,355	2,875	325	40	4,600			70	63,690
Nonrestocked cut-over and burned areas Types 35, 35A, and 37	34,325	7,790	9,805	45	60	4,720	4,005	1,640	60	62,450
Hardwoods Types 31 and 31.5	11,245	365	675		950			40		13,275
Noncommercial areas Types 26, 33, & 38	2,105	550	240			8,760	10,370	11,955	25	34,005
Total forest types	318,050	40,655	56,495	3,225	4,575	104,200	19,505	34,540	785	582,030
Nonforest land Types 2 and 3	22,100	395	390	95	715	370	4,885	1,290		30,240
Total	340,150	41,050	56,885	3,320	5,290	104,570	24,390	35,830	785	612,270

^{1/} Available for cutting.

^{2/} Reserved from cutting.

^{3/} Includes 665 acres available for cutting and 120 acres reserved from cutting.

Conifer Second Growth

Figure 1 discloses that a large part of the county is stocked with second growth. In the southern half, in particular, young conifer stands extend for miles in practically unbroken cover. Study of the type area statistics shows that a total of 260 thousand acres or approximately 45 percent of the total forest land in the county is stocked with

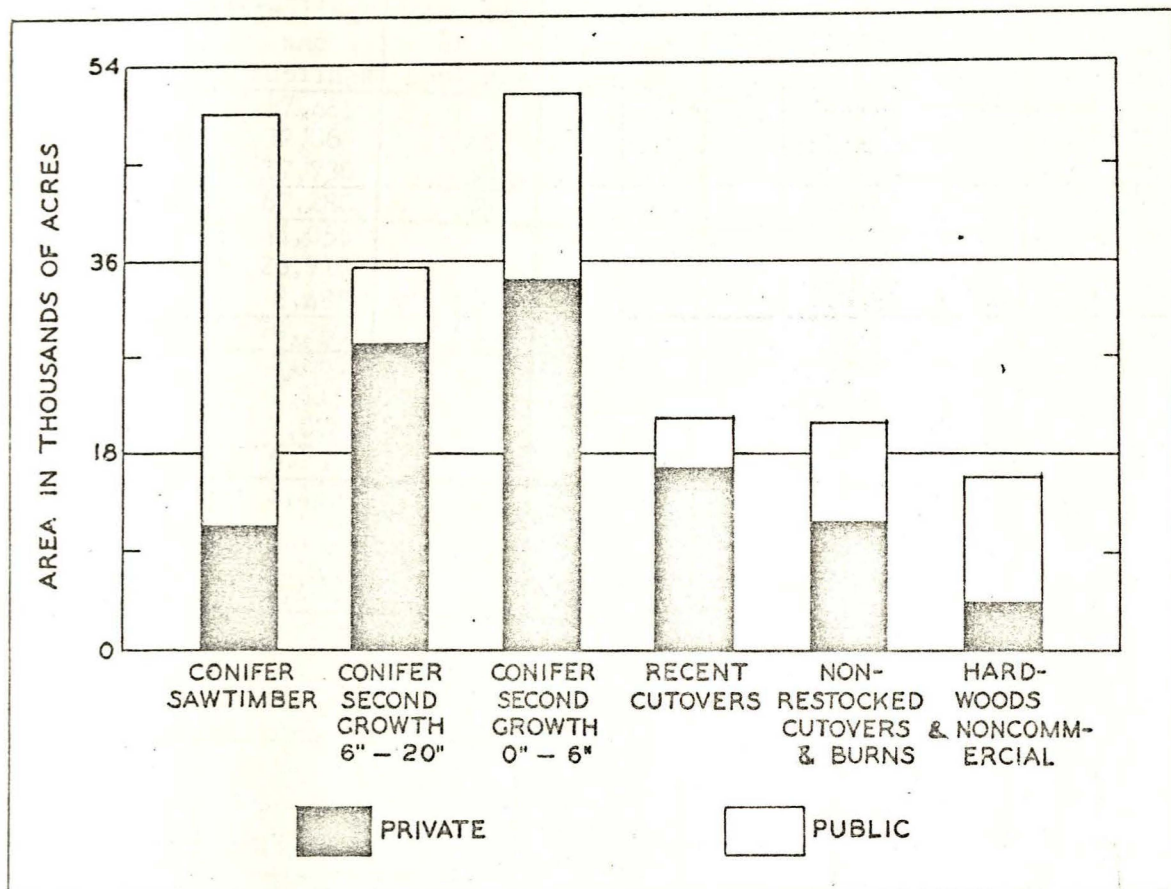


Figure 2. Generalized forest types by ownership class (from table 2).

conifer second-growth timber from 0 to 20 inches d.b.h. Also, in table 3, which shows the area, in acres, of certain immature conifer forest types, by age class and degree of stocking, it is seen that on 124.5 thousand acres, or 48 percent of the total second-growth conifer area, the stands are well stocked, on 93.1 thousand acres, or 36 percent, they are of medium stocking, and are poorly stocked on 42.4 thousand acres, or 16 percent. These figures indicate a density of stocking considerably higher than the average for the Douglas-fir region. Unfortunately, early prospects of future crops of saw timber from these immature stands are somewhat less promising than these statistics would seem to indicate. Approximately

Table 3.-Area, in acres, of certain immature conifer forest types,
by age class and degree of stocking

Data corrected to August 15, 1940

Age class (years)	Degree of stocking	Type number and name					Total
		10 Douglas- fir seedlings and saplings	16 Western hemlock seedlings and saplings	9 Douglas- fir small second growth	15 Western hemlock small second growth	19 Western redcedar second growth	
10	Good	17,485					17,485
	Medium	32,065	45				32,110
	Poor	17,730	30				17,760
	Total	67,280	75				67,355
20	Good	44,055					44,055
	Medium	26,710					26,710
	Poor	8,485					8,485
	Total	79,250					79,250
30	Good	2,865		5,555			8,420
	Medium	2,115		3,910	380		6,405
	Poor	1,075		2,370			3,445
	Total	6,055		11,835	380		18,270
40	Good	1,425		15,530	230		17,185
	Medium			9,925			9,925
	Poor			1,035			1,035
	Total	1,425		26,490	230		28,145
50	Good			23,400			23,400
	Medium			7,795			7,795
	Poor			2,980			2,980
	Total			34,175			34,175
60	Good			8,375		120	8,495
	Medium			1,595			1,595
	Poor			1,915			1,915
	Total			11,885		120	12,005
70	Good			3,375			3,375
	Medium			3,610			3,610
	Poor			3,910			3,910
	Total			10,895			10,895
80	Good			1,195			1,195
	Medium			1,530	95		1,625
	Poor			905			905
	Total			3,630	95		3,725
90+	Good			880			880
	Medium			2,435	865		3,300
	Poor			2,025			2,025
	Total			5,340	865		6,205
Total all ages	Good	65,830		58,310	230	120	124,490
	Medium	60,890	45	30,800	1,340		93,075
	Poor	27,290	30	15,140			42,460
	Total	154,010	75	104,250	1,570	120	260,025

56 percent of the total area of second-growth conifer stands is stocked with trees in the 10- and 20-year age classes, and 87 percent with trees less than 55 years of age. Also, on a considerable acreage the more densely stocked stands are in such a stagnated condition that they are putting on very little growth. This is particularly true in the central and northeastern portions of the county where the site, due to the gravelly character of the soil and often poor subsurface drainage, is low in productivity. The most thrifty stands of second growth are found in the southern portion of the county where the quality of the site averages considerably higher.

Like the original stands that stocked the county, the second-growth stands are preponderantly Douglas-fir. On all but about 1 percent of the total restocked area, Douglas-fir comprises 60 percent or more of the number of stems in the stand and many of the stands are composed entirely of this species. Stands in which immature western hemlock is the key tree are found almost entirely in the mountainous northwestern portion of the county.

Another rather significant fact regarding the second-growth stands is the large percentage of the area occupied by them that is restocked cut-over land. Only about 6 percent of the area is restocked burns.

The older second-growth stands occur principally in the eastern portion of the county along tidewater where logging operations began.

Recent Cut-Over Areas

Areas clear cut since January 1, 1930, total 63.7 thousand acres, or about 11 percent of the county's forest land. The largest areas of this type are on Kitsap Peninsula in the elbow of Hood Canal and in the lower drainages of the main and north forks of the Skokomish River. No examination of these lands to determine the condition of regeneration was made at the time of the reinventory. On some of the larger tracts seed supply may be inadequate, particularly on the Kitsap Peninsula where only small isolated fragments of the original stand remain. However, on the smaller tracts there is usually a seed source fairly close by.

Nonrestocked Cut-Over and Burned Areas

In this generalized group of types are included areas logged prior to 1920 that are nonrestocked, areas logged during the decade 1920-29 that are nonrestocked, and all nonrestocked burns regardless of date of the fire.

Areas logged prior to 1920 that are less than 10 percent restocked total 11.7 thousand acres. This acreage is comprised of several scattered areas of a few hundred acres in extent. None are more than 1,500 acres. Some of these areas are fairly near to seed supply and barring recurring fires, may restock in a comparatively short time. Other areas, surrounded

by seedling stands of Douglas-fir, will probably remain nonrestocked for a considerable number of years.

Examination during the reinventory of areas logged during the decade 1920-29 disclosed a total of 40.3 thousand acres nonrestocked. As data obtained in the original inventory show that approximately 100 thousand acres was cut over during the decade, results of this examination indicate that only 60 percent of this cut-over area had restocked by 1940. The nonrestocked acreage is made up of a few fairly large tracts and several small ones. The largest solid tract of this type, located in the southwestern part of the county, contains about 7 thousand acres, and on two sides adjoins Douglas-fir second growth approximately 40 years in age.

Deforested burns total about 10.5 thousand acres. Nearly all of this acreage is on rocky slopes and ridges adjacent to the subalpine timber zone.

Hardwoods

Hardwood stands cover a total of about 13.3 thousand acres of bottomlands and lower slopes. About a third of this acreage is along the lower Skokomish River; the remainder is in scattered tracts. The majority of the stands are of red alder; a few contain a mixture of alder and bigleaf maple; and there is a narrow stringer of northern black cottonwood along the Skokomish River. Trees on about three-fifths of the total hardwood acreage are of saw-timber size (12 inches and more d.b.h.).

Noncommercial Areas

Approximately 34 thousand acres of forest land supports timber which for one reason or another was considered to be of noncommercial quality.

Lodgepole pine stands in which the trees are less than 12 inches d.b.h. are found on about 2.9 thousand acres. This acreage is in several areas in the lower-lying central portion of the county. On these areas the quality of the site is too poor for the production of Douglas-fir.

The subalpine type extends over 24.6 thousand acres of the upper slopes and ridges in the mountainous national forest and national park. Stands in this type are composed of varying mixtures of mountain hemlock, Pacific silver fir, lodgepole pine, and western white pine. The timber is too short, limby, and rough to be of commercial quality.

Noncommercial rocky areas totaling about 6.5 thousand acres are located also in the national forest and national park. They lie below the subalpine zone but, because of the rocky character of the site or the steepness of the slope, the timber is either of poor form or quality or too inaccessible to be classified as commercial.

Forest Site Quality

All forest lands in the county considered capable of producing conifer timber of commercial quality were rated as to their site quality or productive capacity. Results of this classification are shown in table 4. On the basis of the original type a total of 494.8 thousand acres was rated according to the Douglas-fir site classification and 40 thousand acres by the spruce-hemlock site classification.

Under both classifications the forest lands of the county average low in productivity. Over one-half of the acreage rated on its ability to produce Douglas-fir was classed as site qualities IV and V, the next to poorest and poorest classes, and most of the remainder was site III, which is only of average productivity. The large acreage of the coarse gravelly soils of the central and northeastern portions of the county rate site class IV and the poorly drained areas as site class V. The better sites occur in the southern portion and in the lower foothills of the Olympic Mountains.

Nonforest Land

Lands in Agricultural Use

A total of 18.4 thousand acres was classified by the survey as being in agricultural use, either cultivated or stump-land pasture which was a part of a farm unit. Bureau of the Census statistics for 1940 show there were 769 farms in the county with a total acreage of 43,995 acres. This total was comprised of 6,234 acres of cropland, 2,842 acres of plowable pasture, 24,760 acres of woodland, and 10,159 acres of other land. The latter class includes some nonrestocked lands which were mapped in the survey as stump pasture. A comparison with statistics obtained in the 1930 census shows that the acreage in farms had increased about 12 percent but the number of farms had increased 70 percent. The average size of farm had decreased 33 percent.

Lands in agricultural use are not concentrated in any particular region but are widely scattered throughout much of the county. Some of the larger areas under cultivation are on the bottomlands along the lower Skokomish River. Many of the farms are near tidewater along the bays and inlets of Puget Sound.

Because of the character of the soil and the relatively high cost of clearing, the cut-over lands have not proven attractive for agricultural use. As the area of uncleared alluvial bottomland is limited, it is improbable that the acreage of cultivated land will be increased very greatly in the near future.

Other Nonforest Land

Lands in this category include high mountain barrens, swamps and

Table 4.-Land areas, forest land areas, and commercial conifer areas,
by site quality class^{1/}
Data corrected to August 15, 1940

Kind of forest land and site quality class	Total area		Area in forest land	Area in commercial conifers
	<u>Acres</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Commercial conifer				
Douglas-fir				
Class I	3,275	0.5	0.6	0.6
Class II	37,760	6.2	6.5	7.1
Class III	199,225	32.5	34.2	37.2
Class IV	238,485	39.0	41.0	44.6
Class V	16,035	2.6	2.7	3.0
Total	494,780	80.8	85.0	92.5
Spruce-hemlock				
Class III	3,450	0.6	0.6	0.6
Class IV	20,600	3.4	3.6	3.9
Class V	15,920	2.6	2.7	3.0
Total	39,970	6.6	6.9	7.5
Total commercial conifer	534,750	87.4	91.9	100.0
Lodgepole pine	2,920	0.5	0.5	
Subalpine	24,575	4.0	4.2	
Noncommercial rocky	6,510	1.1	1.1	
Hardwood	13,275	2.1	2.3	
Total other	47,280	7.7	8.1	
All forest land	582,030	95.1	100.0	
Nonforest land	30,240	4.9		
Grand total	612,270	100.0		

^{1/} The "site quality" of a forest area is its relative productive capacity, determined by climatic, soil, topographic, and other factors. The index of site quality is the average height of the dominant stand at the age of 100 years. Five site quality classes are recognized for both Douglas-fir and spruce-hemlock types, Class I being the highest. In the survey Douglas-fir classifications were used for Douglas-fir and western redcedar types; spruce-hemlock classifications were used for Sitka spruce, western hemlock, and upper-slope types.

unmeandered water, tidelands and town sites. The greater part of the total of 11.8 thousand acres is in mountain barrens.

Saw-Timber Volume

The reinventory in 1940 showed a total merchantable saw-timber volume of 6,472 million board feet, log scale, Scribner rule. In table 5, which shows the volume of timber by species and ownership class, it is seen that 9 conifer and 3 hardwood species comprise this total. However, all but 24 million board feet is of conifer species.

Of the volume of Douglas-fir, which is 4,010 million board feet or approximately five-eighths of the total of all species, about 38 percent is large old growth more than 40 inches d.b.h.; 50 percent is small old growth from 20 to 40 inches d.b.h.; and 12 percent is second-growth timber 16 to 40 inches d.b.h.

The volume of western hemlock, the only other species of which there is an appreciable amount, is 1,424 million board feet.

Approximately three-fourths of the small volume of hardwood species is red alder.

Nonreserved timber totals 5,326 million board feet or about 82 percent of the total volume. Of this, 1,037 million board feet is privately owned, and the remainder is in public or Indian ownership. Of the publicly-owned available timber, 4,041 million is on national forest land. A little over three-fourths of the reserved timber volume is in the Olympic National Park; the remainder is in the national forest primitive area and on municipally-owned lands adjacent to Cushman Reservoir.

Under current economic conditions, it is probable that only about three-fifths of the nonreserved timber volume is available for profitable utilization.

Figure 3 shows the distribution of the saw-timber volume by species and broad ownership class.

Utilization of the Forest Resource

In the preceding analysis of type areas and timber volume statistics, it is seen that the major part of the county's original forest stand has been harvested. The logging of this large amount of timber and the milling of a considerable portion of it locally has provided the principal basis of the social and economic development of the county. Exploitation of the county's other natural resources such as water power, agricultural lands, and fisheries, although important, has been minor in comparison to the part played by exploitation of the forest resource.

Table 5.-Volume of timber by species and ownership class
Data corrected to August 15, 1940

Trees 16" and more d.b.h.^{1/}
Thousands of board feet, log scale, Scribner rule

Species	Private	State ^{2/}	County	Municipal ^{3/}	Indian	Federal				Total
						National forest		National park ^{3/}	Other ^{2/}	
						Available	Reserved			
Douglas-fir										
Large old growth	216,734	60,797	2,117	10,216		1,026,533	40,970	150,671	64	1,508,102
Small old growth	464,999	70,554	5,345	22,291		1,273,830	18,475	170,482	149	2,026,125
Large second growth	76,326	34,165	3,683	1,064		109,647	9,931		50	234,866
Small second growth	180,074	28,841	15,316	2,350	410	13,888			171	241,050
Sitka spruce										
Large	104									104
Small	47									47
Western hemlock										
Large	25,817	9,185	318	2,872		1,032,428	76,777	276,364	44	1,423,805
Small	8,846	1,732	169	507		190,326	13,806		8	215,394
Mountain hemlock						2,765	20	5,994		8,779
Western redcedar										
Live	36,130	8,179	377	4,343	70	168,247	11,314	76,545	2	305,207
Dead	1,942					4,087	336	9		6,374
Alaska yellow-cedar						4,883	1,412	3,263		9,558
Western white pine	6,347	1,180	114	270		47,322	3,192	2,958	12	61,395
Pacific silver fir	8					151,029	42,247	196,735		390,019
Grand fir	463					15,103	900			16,466
Red alder	15,282	1,228	1,134	75	905	10		32	7	18,673
Bigleaf maple	2,986	298	82	37	140	279		7	3	3,832
Black cottonwood	791				35	1,103		6		1,935
Total	1,036,896	216,159	28,655	44,025	1,560	4,041,480	219,380	883,066	510	6,471,731

^{1/} Trees of hardwood species taken from 12" and more d.b.h. ^{2/} Available for cutting. ^{3/} Reserved from cutting.

Although Bureau of the Census statistics for 1940 are not yet available, those for 1930 are perhaps more significant since they are nearer to the peak period of lumbering operations in the county, 1925-29. The statistics show that of the 4,393 persons employed in the county in 1930, 1,490, or 34 percent, were directly engaged in lumbering and allied industries. In the same year, 524 persons, or 12 percent of the total, were engaged in agriculture.

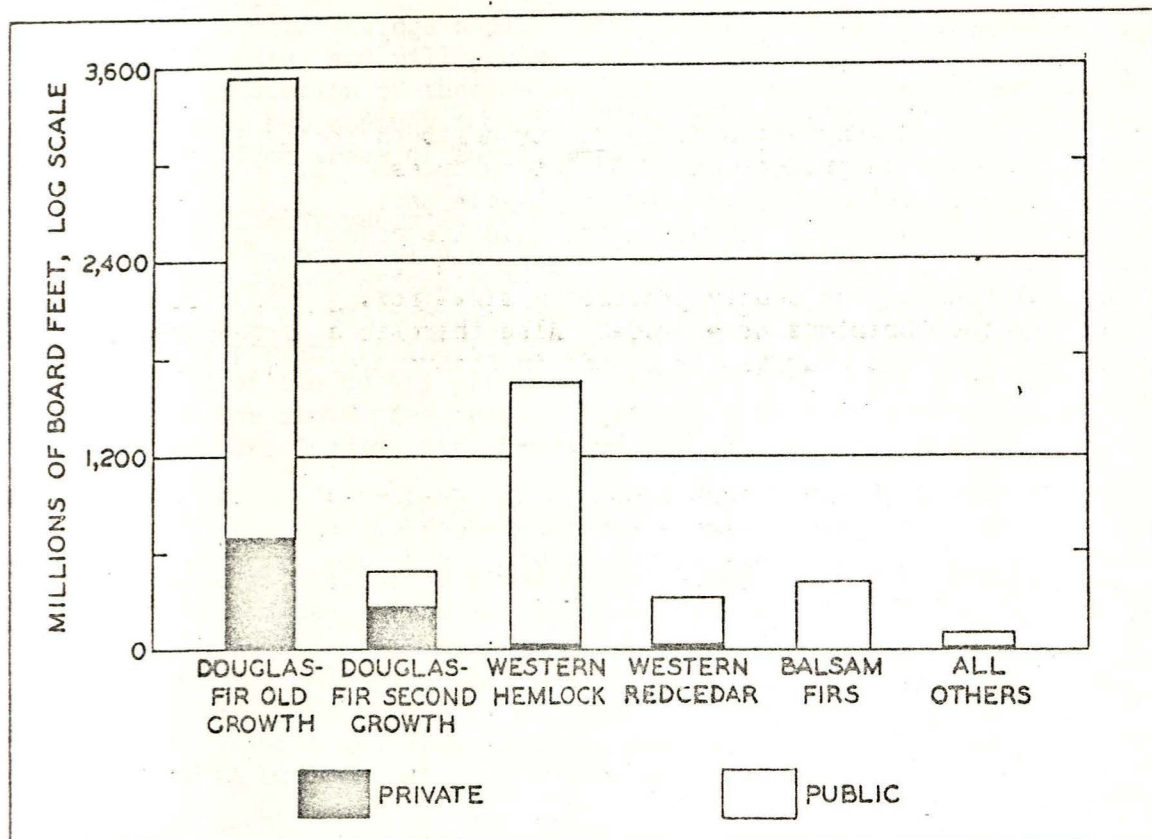


Figure 3. Distribution of saw-timber volume by species group (from table 5).

Statistics for sawlog production for the 16-year period 1925-40 show an average annual cut of 215 million board feet. Peak years during the period were 1928 and 1929 when more than 500 million board feet was cut in each of the two years. The cut dropped very materially during the depression period 1930-33, then increased steadily through 1937, dropped sharply in 1938, increased again in 1939 and exceeded the average cut for the 16-year period, but fell below the average again in 1940.

Large quantities of sawlogs have been shipped out of the county to other Puget Sound lumbering centers. On the other hand, the sawmills and the pulp mill in the county have imported logs from neighboring counties.

Sawmill capacity in the county has not varied greatly since 1925 although lumber production has fluctuated with general market conditions. In 1940 there were two fairly large mills and two small ones in operation. A pulp mill of a 24-hour capacity of 300 tons of bleached sulphite pulp is located at Shelton.

In addition to sawlogs small quantities of fuel wood, pulpwood, shingle bolts, posts, and piling have been cut annually in the county. Statistics on production of these minor forest products are not available for recent years, but a study made in 1930⁴ showed a cut of about 3 million board feet from trees of saw-timber size.

For a good many years Mason County has been the leading county in the State in the production of Christmas trees. Statistics furnished by the State Forester's office for the 3-year period 1935-37 show an average annual cut of 583 thousand trees in the county. This cut represented about 39 percent of the total number cut in the State. The site throughout much of the county produces a slow-growing bushy tree well suited for the Christmas tree trade. Also there is a large acreage of accessible immature Douglas-fir stands in the younger age classes.

Other Depletion

Depletion of the forest resource by agencies other than cutting is difficult to compute. Fire has annually caused drain in the forests of the county, but this loss in recent years has been principally in immature stands and, although important, is not measurable in board feet. Saw timber killed by fire and not salvaged has been small in volume. Likewise, such natural agencies as wind, forest, insects, and disease have caused drain but only at a rate that is considered normal.

Forest Growth

Offsetting in part the annual drain on the forests of the county due to cutting, fire, and natural enemies, the thrifty immature stands have been putting on increment.

In the survey it was assumed that the only stands putting on net increment were those less than about 160 years of age. Net increment in stands from 160 to about 300 years is thought to be offset by net loss due to mortality and decay in older stands. On this basis and using data obtained in the reinventory, the acreage of growing conifer stands on unreserved lands was found to be 266 thousand acres.

⁴/ Johnson, Herman M. The Production and Consumption of Minor Timber Products in Oregon and Washington. Office report, Pacific Northwest Forest Experiment Station.

On these unreserved growing stands, the current annual growth, or the annual increment of the stands in their present condition, was computed to be 9.6 million board feet in trees 15.1 inches and more d.b.h. estimated in 32-foot logs to a 12-inch top diameter inside bark. Assuming a more intensive utilization standard in which the minimum tree is 11.1 inches d.b.h. estimated in 16-foot logs to an 8-inch top diameter, the current annual growth was computed to be 45.5 million board feet.

Another calculation involving growth estimates is a computation of the annual cut allowable under sustained yield management. If one assumes a rotation period of 100 years for the forests of the county under management, the present unreserved mature timber volume in all ownerships of 4,638 million board feet would furnish an annual cut of about 46 million board feet. To this figure should be added the mean annual board-foot increment to rotation age of the present unreserved immature conifer stands of all ages. Roughly, these immature stands are stocked to about 70 percent of normal. Assuming this degree of stocking, the mean annual board-foot increment in all immature conifer trees 11.1 inches and more d.b.h. estimated in 16-foot logs to an 8-inch top diameter inside bark on unreserved lands would be approximately 64 million board feet. In this calculation the utilization standard is considerably more intensive than prevails in the county at present. However, it is assumed that when this second-growth timber is ready for cutting such a standard will prevail. The 64 million board feet of second growth added to the cut of 46 million board feet of mature timber would indicate a total annual allowable cut of 110 million board feet, only a little more than one-half of the volume of sawlogs produced annually in the county in recent years. Obviously, the continued harvesting of mature timber at a rate in excess of the allowable cut and any premature cutting of second-growth timber will very materially reduce future allowable annual cuts. Also, the allocation of the cut of mature timber assumes that all of it will be operable when scheduled for cutting. Actually some of it may prove unprofitable to log and the allowable cut would have to be decreased accordingly.

Comparison of Inventories

Considerable insight into the current forest situation in Mason County, as regards timber supply, rate of depletion, and rate of replenishment, can be obtained by comparing results of the original and revised inventories. Such a comparison follows:

	<u>1932 inventory</u>	<u>1940 inventory</u>	<u>Change</u>
Forest land area	578 M acres	582 M acres	+0.7%
Saw-timber stands	210 M acres	149 M acres	-29%
Conifer second growth 6-20" d.b.h.	83 M acres	106 M acres	+28%

Conifer second growth 0-6" d.b.h.	96 M acres	154 M acres	+60%
Privately-owned forest land	370 M acres	318 M acres	-14%
Privately-owned saw-timber stands	85 M acres	34 M acres	-60%
Saw-timber volume	7,902 million bd. ft.	6,471 million bd. ft.	-18%
Douglas-fir volume all sizes	5,273 million bd. ft.	4,010 million bd. ft.	-24%
Douglas-fir volume large old growth	1,912 million bd. ft.	1,508 million bd. ft.	-21%
Privately-owned saw- timber volume	2,261 million bd. ft.	1,037 million bd. ft.	-54%
Nonreserved saw-timber volume	7,968 million bd. ft.	5,326 million bd. ft.	-33%
Reserved saw-timber volume	34 million bd. ft.	1,146 million bd. ft.	+3,271%

The increase in forest land acreage was due chiefly to more intensive classification and mapping of nonforest land in the reinventory rather than a reclamation of nonforest land by forest growth.

In the interim between inventories, approximately $7\frac{1}{2}$ years, the area of saw-timber stands was reduced 61 thousand acres or roughly at the rate of 8 thousand acres per year. On a percentage basis the annual reduction amounted to about 4 percent. The bulk of the cutting was in privately-owned stands; reduction of their acreage totaled 51 thousand acres, causing a decrease of 60 percent in the privately-owned acreage as of 1932. The decrease of publicly-owned saw-timber area was due in part to the reclassification, in the reinventory, of some of the stands on steep upper slopes in the national forest as noncommercial timber. The considerably smaller percentage of decrease in total saw-timber volume, 18 percent, against a decrease of 29 percent in saw-timber acreage indicates that during the period between inventories the stands that were cut were of less volume per acre than the present remaining stands. Comparison of the original detailed forest type map with the revised map bears out this fact since it shows that most of the cutting during the period was of stands on the poorer sites and also of small residual stands that were passed up in the first sweep of logging across the county. A considerable part of the remaining saw-timber acreage is stocked with stands of timber heavier in volume and better in quality than the stands that

have been logged. The smaller decrease in volume of large old-growth Douglas-fir than in volume of this species of all sizes also substantiates the explanation, since the reduction of stands of this most desirable class of fir was only about 5 thousand acres.

The increase of 23 thousand acres in area of conifer second growth, 6-20 inches d.b.h., was the result of the transition of sapling stands to small pole stands.

The 60 percent increase in conifer second growth, 0-6 inches d.b.h., was the result of regeneration of areas logged during the decade 1920-29, which were classified as recent cut-over land in the original inventory, and to the restocking of 13 thousand acres logged prior to 1920, that were nonrestocked in 1932.

Creation of the Olympic National Park in 1940 and the Olympic Primitive Area in 1936 placed 883 million board feet and 219 million board feet, respectively, into a reserved-from-cutting status.

Summary of Situation

The major portion of the more accessible timber in the county has been harvested and remaining stands lie principally in the rough mountainous northwestern portion of the county. Since a large part of the acreage of these stands is in national-forest ownership, the timber will be harvested under sustained-yield management. It is, of course, desirable that the private and State saw timber intermingled with that Federally owned will be managed similarly.

Scattered stands of saw timber, chiefly small old-growth Douglas-fir, remaining in the eastern and southern portions of the county are accessible and will no doubt be heavily cut during the present increased activity in lumbering operations.

Annual depletion due to cutting has averaged about 190 million board feet during the last 5 years but a very material drop in annual cut of sawlogs in the county in the next decade is inevitable. As the present sawmills and pulp plant are located on tidewater, they are not dependent on local timber but may continue to operate for some time, principally on logs obtained from nearby Puget Sound log markets. A substantial decrease in logging operations is certain to seriously affect the economy of the county since this industry has been one of the principal employers of labor. Unfortunately, any expansion in the exploitation of the other natural resources cannot be expected to materially offset the effect of curtailment of the lumbering industry.

The 260 thousand acres of second-growth timber in the county is encouraging, but the fact that 87 percent of this acreage is stocked with stands in the 10- to 50-year age classes and that most of the stands are on sites of low productive capacity does not promise early

future crops of sawlogs. However, the cutting of Christmas trees from second-growth stands brings in an early revenue and, if properly managed, it is probable that on the poorer sites the growing of this product will be more profitable than the production of saw timber. Many of the stands would materially benefit from thinning and in some cases such thinnings would furnish Christmas trees. Naturally, the better trees are obtained from stands that are not too densely stocked.

Because of the rather limited amount of second-growth timber from 16-20 inches d.b.h. and the relative inaccessibility of some of the type 8 stands (timber 20 to 40 inches d.b.h.), the premature cutting of this class of timber has not been a serious problem.

The 62 thousand acres of nonrestocked cut-over and burned areas constitutes a serious problem of idle land which will not be readily solved. Satisfactory restocking of this acreage would materially help in reducing the large disparity between current and potential growth rates.